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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/677,698	09/28/2000	Rajendran Nair	42390.P9239	3386

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EXAMINER
RAO, SHRINIVAS H

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/677,698	NAIR ET AL.	
	Examiner	Art Unit	
	Steven H. Rao	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-14 and 20-23* is/are pending in the application.

4a) Of the above claim(s) *8-14* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *2-7 and 20-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Response to Amendment

Applicants' amendment filed on February 28, 2003 has been entered on March 15, 2003.

Therefore claims 2-7 and 20 as amended by the amendment and claims 21-23 as previously recited are currently pending in the Application.

Claims 1 and 15-19 are cancelled by this amendment and claims 8 to 14 were previously withdrawn from the Application.

Election/Restrictions

This application contains claims 8-14 that are drawn to an invention nonelected with traverse in Paper No. 3 (mailed 11/05/01)

A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Drawings

The corrected drawings filed on March 15, 2003 have been accepted by the drafts person.

Claim Objections

As previously stated the language " a metallic gate electrode to couple to a positive power supply voltage" is indefinite and may be substituted by " a metallic gate electrode coupled to a positive power supply voltage".

Similarly " gate insulator area" may be replaced by " gate insulator"

" diffused drain area " may be replaced by " diffused drain"

" channel area " by "channel"

" diffused source area" by " diffused source".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-7 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stein et al. (U.S. Patent No. 4,055,837 herein after Stein) and Howard (U.S. Patent No. 4,437,139 herein after Howard) and Dawson et al. (U.S. Patent No. 5,851,891, herein after Dawson). (for response to Applicants' arguments see response to arguments section below).

With respect to claim 2, Stein describes an apparatus (device) including : a Mos (metal-oxide-semiconductor) transistor (fig. 1 # 31, col. 2 lines 7-8) , a metallic gate electrode coupled to a diffused gate region of said metal-oxide-semiconductor-transistor and to a positive voltage source.

Stein does not specifically mention a metallic gate electrode however it is inherent that a NMOs or PMOS are devices will have a metallic gate.

Stein and Howard describe a MOS transistor but do not specifically describe, "wherein said metal-oxide-semiconductor includes a diffused gate region material with a work function less than –0.56 volts"

However Dawson in col. 2 lines 48-50 describes the formation of IGFETs with any desired gate work function to from devices with low gate resistivities.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to make Stein's device with any desired gate work function as described by Dawson (including those less than 0.56 volts) to form devices with low gate resistivities. (Dawson col.2 line 49, Dawson in col. 4 lines 52-67 and col. 5 lines 1-15 also describes diffused gate material) .

With respect to claim 3 wherein the diffused gate region material is platinum silicate. (Howard col. 3 lines 31).

With respect to claim 4, wherein said diffused gate material is selected from the group consisting of Tantalum nitrate, iridium, nickel and arsenic. (Howard col. 3 lines 30-34). With respect to claim 20, Stein describes an apparatus including a metallic gate electrode to couple to a positive power supply voltage (Stein fig. 2), a diffused gate region with a material whose work function is less than minus 0.56 volts (Dawson col. 2 line 49, see claim 2 above), a gate insulator area (Stein fig.2 # 22 or 23), a channel area coupled to the gate insulator area (Stein fig. 2 area between drain 31 and source 13 coupled to 22 or 23), a diffused drain area coupled to said channel area (Stein fig. drain 31 coupled to the channel) and a diffused source area coupled to said channel area (Stein fig. 2 source 13 coupled to the channel).With respect to claim 21, wherein said material is platinum silicate. (Howard col. 3 lines 31).

With respect to claim 22, wherein said material is selected from the group consisting of Tantalum nitrate, iridium, nickel and arsenic. (Howard col. 3 lines 30-34).

With respect to claim 23, wherein the substrate is heavily doped . (Stein col.2 line 24-26).

Response to Arguments

Applicant's arguments with respect to claims 1-7 and 15-19 have been considered but are not persuasive for reasons set out below :

It is noted that Applicants' are arguing individual references whereas the rejection is based on the combined teachings of the references.

Applicants' first argument (claims 2, 9 etc) is that Dawson in col. 2 lines 48-50 describes,

> Accordingly, a need exists for a method of fabricating an IGFET that provides a low resistivity gate with the desired "D work function.

and the above statement of a need existing is not an enabling disclosure of forming a gate with any particular work function.

It is noted that the above statement is in the background of the invention section and Dawson describes in the "Summary of the Invention" section col.3 lines 15 to 19 as follows :

> A key advantage of the invention is that a highly miniaturized IGFET can be provided with an ultra-thin polysilicon gate having a well-controlled doping profile, thereby providing a low-resistance gate as well as the desired threshold voltage and drain current. --

It is also well known that " work function " can be taught of as a kind of electrical compatibility and the threshold voltage is determined by the work function between the gate material and the doping level in the semiconductor.

Therefore the key advantage of Dawson's disclosure is controlling threhold voltage thereby the work function.

Applicants' second argument that Howard does not teach the use of platinum silicate in a diffused gate region is not persuasive because Howard in col. 3 lines 43-46 describes heating dual bottom electrode to form inter metallic phase by diffusion.

Howard col. 3line41 describes TaN.

Claims 5-7 are rejected for reasons previously set out and reasons stated under claim2 above.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Steven H. Rao whose telephone number is (703) 306-5584. The examiner can normally be reached on Monday- Friday from approximately 7:00 a.m. to 5:30 p.m.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. The Group facsimile number is (703) 308-7724.

Steven H. Rao

Patent Examiner

May 31, 2003.

SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800